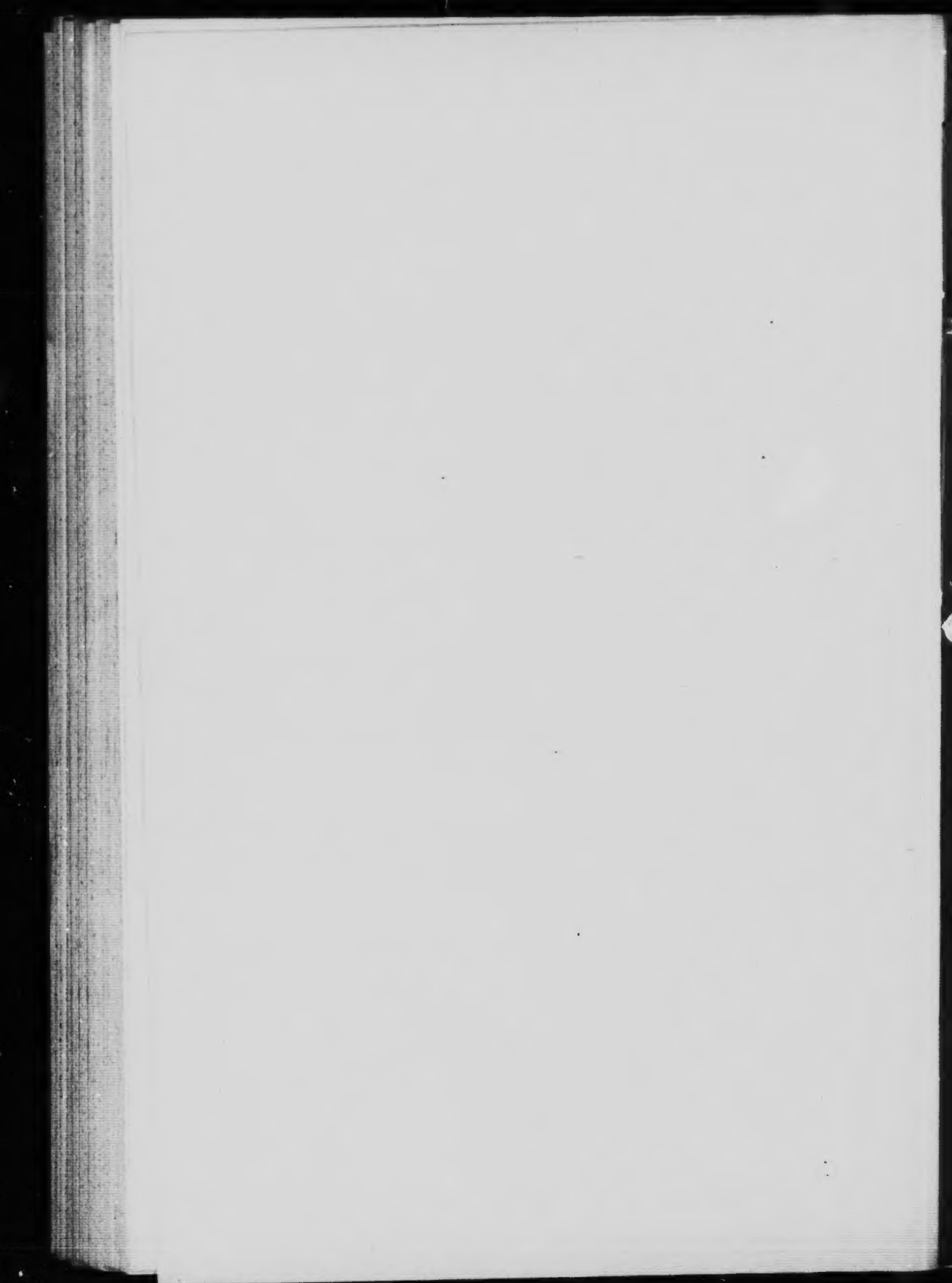


LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA

BULLETIN No. 211

OIL OF TURPENTINE



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OIL OF TURPENTINE.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

OTTAWA, July 14, 1910.

SIR:—*Oil of Turpentine* (Terebinthinae Oleum) commonly called turpentine, is a drug recognized by the British and other Pharmacopoeias, and therefore comes within the scope of the Adulteration Act. It is a question whether the article, as employed in the arts, should be required to meet pharmacopoeal specifications; but until this point is settled, we must hold that "turpentine" means the turpentine of the pharmacopoeias.

The British Pharmacopoeia (Edn. 1898) thus describes the drug, "Limpid, colourless, with a strong peculiar odour which varies in the different kinds of oil, and a pungent and somewhat bitter taste. It is soluble in its own weight of glacial acetic acid. It commences to boil at about 320°F. (160°C.) and almost entirely distils below 356°F. (180°C.) leaving no residue remaining".

Squire's Compendium (1908) comments as follows;—"Rectified Oil of Turpentine has a sp. gr. 0.860 to 0.880; the B.P. does not give a sp. gr.; the U.S.P. states 0.860 to 0.870. It boils at about 156°C. (312.8°F.), which is the figure given in the B.P. The P.G. states that it distils completely between 155° and 162°C. (311° and 323.6°F.). The B.P. states that it should distil almost entirely below 180°C. (356°F.). This temperature is considered (C. D. '98, ii. 55) to be too high, boiling at about 155° C. (311° F.) and at least 80 p. c. distilling below 165° C. (329° F.) would have been better.—The U.S.P. requires that the larger part of the oil should pass over between 155° and 162° C. (311° and 323.6° F.). The optical rotation of the oil may be either dextrogyrate or laevogyrate. French Oil of Turpentine is strongly laevorotatory (−20° to −40° in a tube of 100mm. length). American Oil of Turpentine is dextrogyrate, the rotation usually varying from +9° to +14°. A 52 lb. quantity when fractionally distilled (C.D. '00, ii. 174) yielded up to 162.5 C. (324.5° F.) a distillate (91.2 p. c. of the whole) which was entirely dextrogyrate and from 162.5° to 190°C. (324.5° to 374°F.) fractions (amounting to 8.52 p. c.) which increased in laevorotation with the boiling point, namely from −0.8° to −10.3°. Neither the B.P. the U.S.P. nor the P.G. refers to the optical rotation. It is officially stated

to be soluble in its own volume of Glacial Acetic Acid. This test has been shown (P.J. '02, i.503) by the author and C. M. Caines to be practically of no value as a test for Oil of Turpentine, although useful as a test of the strength of Glacial Acetic Acid. An acid conforming strictly to the B.P. titration test (which requires a definite figure) cannot be expected to form a clear solution with all samples of Oil of Turpentine when mixed in equal volumes. Commercial samples of Glacial Acetic Acid which require more than the B.P. figure will mix readily without subsequent separation, and most of the commercial acids give a higher figure than the B.P. With such samples of Oil of Turpentine as had up to that time been examined the mixture of any of them in equal volumes with Glacial Acetic Acid, temperature 14.4° to 16.7° C. (58° to 62° F.) became a delicate test for a strength of 99.5 p. c. acid or stronger. The test is also referred to under *Acidum Aceticum Glaciale*.

The more generally occurring impurities are Petroleum, Paraffin Oils, Rosin, Rosin Oil, Petroleum Benzin, Kerosene Oil or similar hydrocarbons. Petroleum, Paraffin Oils of Rosin, if present, may be detected by the residue test. Kerosene or Rosin Oil, if present, by the evaporation test. Petroleum Benzin, Kerosene and similar hydrocarbons by the Sulphuric Acid test, each of which tests is described in small type below. Some work done in the laboratory of the Canadian Inland Revenue Department (C.D. '02, i.955) has resulted in the following definition of Oil of Turpentine, which must, however, be regarded as provisional, and subject to correction and amplification; it should be colourless, in thin layers, clear, but made decidedly opaque by shaking with 1.0 p. c. of water, and giving an opaque distillate of one-tenth volume which settles clear in a few hours. The peculiar and characteristic odour quite distinct from that of Gasolene, Rosin Oil, or Acetone. It has a sp. gr. between 0.860 and 0.880 (usually about 0.870). Samples which have been long exposed to the air have a higher density. The first 10 p. c. fraction has a sp. gr. of between 0.856 and 0.870 (usually about 0.860); the residual tenth should not exceed 0.900. The boiling point should lie between 154° and 158° C. (309.2° and 316.4° F.); nine-tenths should distil below 180° C. (356° F.). Fixed residue should not exceed 2 p. c., flash point about 32° C. (89.6° F.). The optical activity of the first fraction should increase in a plus direction by oxidation. The refractive index at 20° C. should lie between 1.4667 and 1.4722, that of the first fraction should not exceed 1.470. Moistened Starch Iodide paper should become blue when suspended over Turpentine exposed to the air, free Bromine in solution should be decolorised. Strong Sulphuric Acid should polymerize and char the sample at a boiling temperature, a rise of temperature should result on mixing with Sulphuric Acid."

The above may be taken as summing up all that is known of commercial turpentine, and it is amply evident that definitions and limits of variability are much needed. Reference is made to work done in this laboratory in 1901 (Bulletin 79). This consisted in an examination of 50 samples of commercial turpentine, having regard to the following properties:—

Physical characters—1. Colour.

2. Clearness.

3. Odor.

4. Taste.

5. Density.

6. Boiling point.

7. Volatility.

8. Vapor density.

9. Flash point.

10. Viscosity.

11. Solubility.

12. Solvent power.

13. Rotatory power for polarized light.

14. Refraction.

15. Fluorescence.

16. Oxidisability.

Chemical characters—17. Bromine absorption.

18. Rise of temperature with sulphuric acid.

The results of the examination referred to were summed up as follows, and having regard to a definition of Oil of Turpentine:—"Oil of Turpentine is a liquid, colourless—in thin layers, and having a yellow-red tint, equivalent to about 1 unit of yellow and 0.1 unit of red (Lovibond scale) when viewed in a column 2 dm. long. *Clear*—but made decidedly opaque by shaking with 0.1 per cent. water, and giving an *opaque*—distillate of one-tenth volume, which settles clear in a few hours. *Odour*—peculiar and characteristic, quite distinct from that of gasoline, rosin oil or acetone, and capable of disguising these odours to the extent of 10 per cent. admixture. *Density*—between 0.860 and 0.880, (usually about 0.870) but samples which have been long exposed to air may have a higher density. The *first fraction*—of one-tenth volume, has a density between 0.856 and 0.870 (usually about 0.860). The *residual tenth*—should not exceed 0.900. The *boiling point*—should lie between 154° and 158° C., and nine-tenths should distil below 180° C. The *fixed residue*—on evaporating over boiling water in a 4 inch, hemispherical dish, should not exceed 2 per cent. The viscosity, at 20° C., should be nearly 1.230 (water 1.000) McGill viscosimeter. *Flash point*—should be about 32° C. (Abel instrument). Should *dissolve*—completely in an equal volume of glacial acetic acid, and the first fraction should similarly dissolve. A *saturated solution*—of asphaltum should not be rendered translucent by dilution to ten volumes. (This test is best made by comparison with a sample of known purity.) The *optical activity*—of the first fraction should increase in a + direction by oxidation. The *refractive index*—at 20° C. should lie between 1.4667 and 1.4722. That of the first fraction should not exceed 1.4700. Moistened iodide of starch paper should become blue when suspended over turpentine exposed to air. *Free Bromine*—in solution (see section 17) should be decolorized. *Strong sulphuric acid*—should polymerize and char the sample at a boiling temperature. A *rise of temperature*—(see sec. 18), should result on mixing with sulphuric acid.

Experience since 1901 has shown that our knowledge of the article Commercial Turpentine is yet too indefinite and uncertain to be satisfactory. This is in part due to the nature and origin of the substance as known to commerce in the past. Turpentine is not a definite chemical substance, having a constant composition. It is the more volatile portions of the oleoresins derived from a number of different varieties of *Pinus*. Of later years, owing to the growing scarcity of pine forests, advantage has been taken of the fact that, by treatment in the dry way, or with superheated steam, a volatile product resembling turpentine is obtainable from pine, (roots, chips and other waste material). This article, commercially distinguished as wood-turpentine, (the original substance being called gum turpentine) resembles turpentine, and is even identical with turpentine in so many respects, that it has been found easy to market it under the same name.

But wood-turpentine, although having much in common with true turpentine is not really identical with it. This fact appears to be well known to, and recognized by the trade; and some of the chemical differences between the two are pointed out in a paper by me, contributed to the Society of Chemical Industry. (See Jour. Soc. Chem. Indust., Vol. XXVI (1907) p. 847).

An important paper on turpentine was read before the Society of Public Analysts (London, England) by J. H. Coste, F.I.C. in 1908, and is published in the Analyst, Vol. XXXIII, p. 219. Speaking of turpentine Mr. Coste says:—"There is no doubt that much of the turpentine shipped to Europe from the United States is of a very different character from that which a few years ago was recognized as typical American Turpentine."

Another sophistication of turpentine consists in the addition to it of certain petroleum fractions, which are doubtless sold to greater profit in this than in any other way. The literature of this subject is very voluminous, and scattered. It is, moreover, very contradictory; many writers claiming that, as a solvent for use in paints and varnishes, the various substitutes for turpentine are little, if at all, inferior to the genuine article. It remains, however, that the name turpentine is supposed to stand for a certain and definite product; and it should be possible so to describe that product as to be able with certainty to distinguish between turpentine and its substitutes or imitations.

The report now submitted contains results obtained in the analysis of 75 samples of turpentine purchased in the markets of the Dominion, and of ten (10) samples, furnished by importers and others. These last are indicated by letters. Table I (parts 1 and 2) gives the source of the samples, and the results of analysis. Table II makes a selection of 29 samples which are apparently genuine gum turpentine as judged by the whole results of analysis.

In connection with the results here shown it is important to note as follows :—

1. The percentage weight of Iodine taken up, approximates 370 ; which number was regarded as typical by Worstall (Jour. Soc. Chem. Indust., 1904, 302), and corroborated by myself (J.S.C.I. XXVI) the Hübl solution being employed.
2. The undissolved (unpolymerized) residue, on treatment of 10 cc with 40 cc., of a sulphuric acid containing 20 per cent of the fuming acid, seldom exceeds 10 per cent of the sample.
3. The refractive index of this residue lies between 1.4950 and 1.5000 ; read at 20° C.
4. The refractive index of the sample is about 1.4700 at 20° C.
5. The specific gravity (15.5°C.) is about 0.870.
6. The initial boiling point is not lower than 150°C. under ordinary pressure ; and the greater part (at least 75 per cent volume) distils below 160°C.
7. The middle fraction of 50 per cent volume, distils between 156° and 159°C., in most samples.
8. Ninety per cent by volume distils below 165° C., in most samples.
9. The refractive index of the second fraction of 25 per cent volume, is between 1.4685 and 1.4700 ; and that of the third fraction of 25 per cent is practically 1.4700.
10. The flash point lies between 31°C. and 34°C.

Table III contains the results of examination of nine (9) samples, furnished by various interested parties, and suspected, for one reason or another, to be surrogate. It is unfortunate that very small quantities were supplied in most cases, hence the record is less complete than could be wished. So far as it goes, it may be noted, in contrast to the general conclusions reached for genuine turpentine, that, (1) the Iodine number is decidedly below 370 ; (2) the unpolymerized residue in the first 7 samples falls within the limit for turpentine, while in I & K, the residue exceeds 40 per cent. (3) The refractive index for the first 7 samples, falls within the limits for turpentine, while samples I & K, show a much lower refraction. (4) The same holds true of the refraction of the sample itself. (5) The specific gravity of the first 5 samples is indistinguishable from that of turpentine ; for samples F & G it is quite too high ; and for K it is abnormally low. (6) Initial boiling point and temperature for distillation of 75 per cent indicate a variation from true turpentine especially notable in samples I & K. (7) The limits of temperature for distillation of middle fraction of 50 p. c., are pronouncedly different from those for genuine turpentine. (8) Limit temperature for 90 per cent distillate is too high. (9) The flash point does not serve to distinguish from genuine turpentine.

This study, interpreted in the light of our knowledge of wood-turpentine and of petroleum, justifies the conclusions that the first seven samples in this table (A to G) are essentially wood turpentines ; while samples I & K, are mixtures containing considerable amounts of petroleum.

This report shows that a considerable amount of adulterated turpentine is found on the market in Canada. The adulteration chiefly consists in additions of petroleum fractions ; but, in some instances it is due to substitution by, or addition of wood turpentine.

Wood turpentine is apparently more closely related to turpentine than are petroleum. It is claimed that certain substitutes for turpentine have equal value with the genuine article, for use in the arts. With this aspect of the question, we have nothing to do. It is the duty of this Department to require that nothing else than true turpen-

tine shall be offered for sale, or sold, under that name. The sale of wood turpentine or of petroleum mixtures for paint and varnish manufacture, and for other uses in the arts, may possibly be desirable; but such articles should not be sold under the name turpentine.

I believe that the information herein given will be helpful in enabling a clear and workable definition of turpentine to be made; and I beg to recommend its publication as Bulletin No. 211.

I have the honour to be, sir,

Your obedient servant,

A. MCGILL,
- Chief Analyst.

TABLE I, (PART I) BULL 211—TURPENTINE.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of opinion.)	No. of Sample.
				Quantity.	Cents.			

DISTRICT OF NOVA SCOTIA—R. J. WAUGH, INSPECTOR.

1910.								
Mar.	Turpentine.....	41941	Wm. Robertson & Son, Halifax, N.S.	3 pts.	50	Carolina Pine Product Co., Cleveland, Ohio.	.....	41941
"	"	41942	A. M. Bell & Co., Halifax, N.S.	3 "	37	Unknown.	.....	41942
"	"	41943	Crowell Bros., Halifax, N.S.	3 "	35	W. B. Dicks, London, Eng.	Sold as American Turpentine.....	41943
"	"	41944	Martin & Moore, Halifax, N.S.	3 "	36	Imperial Oil Co., Halifax.	.....	41944
"	"	41945	A. L. Melvin & Co., Halifax, N.S.	3 "	35	Carolina Pine Product Co., Halifax, N.S.	Georgia Pure Turpentine.....	41945

DISTRICT OF PRINCE EDWARD ISLAND—THEO. MOORE, INSPECTOR.

Mar.	7 Turpentine.....	38626	Stanley Shaw & Reardon, Charlottetown.	3 pts.	37	A. Ramsay & Co., Montreal.	.....	38626
"	9 "	38627	R. Tuplin & Co., Kensington.....	3 "	38	Carolina Pine Product Co., Cleveland, Ohio.	.....	38627
"	10 "	38628	R. T. Holman Ltd., Summerside	3 "	40	" .....	.....	38628
"	12 "	38629	S. W. Crabbe, Charlottetown.....	3 "	40	A. Jameison & Co., Montreal.	.....	38629
"	15 "	38630	Sterns Bros., Souris.....	3 "	40	Rogers Hardware Co., Charlottetown.	.....	38630

DISTRICT OF NEW BRUNSWICK—J. C. FERGUSON, INSPECTOR.

Mar.	3	Turpentine.....	39640	Robertson, Foster & Smith, Ltd., St. John, N.B.	45	Standard Oil Co., N.Y., De B. Carrithé Agent, St. John.	39640
"	7	"	39641	W. H. Thorne & Co., Ltd., St. John, N.B.	45	De B. Carrithé, St. John, N.B.	39641
"	9	"	39642	T. McAvity & Sons Ltd., St. John, N.B.	60	North Carolina Pine Varnish Co., U.S.A.	39642
"	15	"	39643	Tweeddale & Co., Fredericton, N.B.	45	Imperial Oil Co., St. John, N.B.	39643
Apr.	6	"	39644	Sumner Co., Moncton, N.B.	30	Carolina Pine Product Co., Montreal.	39644

DISTRICT OF QUEBEC—E. BELAND, INSPECTOR.

Mar.	8	Turpentine.....	36523	T. M. Tardivel, 34 Rue Desjardine, Quebec.	45	The Georgia Turpentine Co., Montreal.	36523
"	8	"	36524	B. Leonard, 53 Rue St. Jean, Quebec.	36	Unknown.	36524
"	8	"	36525	Marier & Tremblay, 71 Rue du Pont, Quebec.	39	Carolina Ripe Production.	36525
"	8	"	36526	Simard & Frère, 270 Rue St. Joseph, Quebec.	42	Unknown.	36526
"	8	"	36527	La Comp. Gauthier, 297 Rue St. Joseph, Quebec.	45	Imperial Oil Co., Quebec.	36527

DISTRICT OF ST. HYACINTHE—J. C. ROULEAU, INSPECTOR.

Mar.	3	Turpentine.....	1256	J. Senesac, Stanbridge Station	20	Unknown	1256
"	3	"	1257	Hill & Depatie, St. Armand	45	Sherwin Williams, Montreal.	1257
"	7	"	1258	G. E. N. Pepin, Drummondville	3	Imperial Oil Co., Montreal.	1258
"	7	"	1259	A. Daveluy & fils, Daveluyville	25	Frothing & Workman	1259
"	18	"	1260	S. Bourgeois & Cie, St. Hyacinthe	33	Carolina Pine Products Co., Savannah, Ga.	1260

TABLE I, (PART I) BULL 211—TURPENTINE—Continued

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cmnt.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (If not an expression of opinion).	No. of Sample.
				Quantity.	Cents.			
DISTRICT OF MONTREAL—J. J. COSTIGAN, INSPECTOR.								
1910.								
Mar. 9	Turpentine.....	40442	B. Beaulien, St. Jerome, P.Q.....	3 pks.	45	Imperial Oil Co., Montreal.....		40442
" 9	"	40443	C. E. Lafamme, St. Jerome, P.Q.....	3 "	45	"		40443
" 14	"	40444	Wall Bros., 67 Bleury St., Montreal.....	3 "	40	Canada Paint Co., Ltd., Montreal.....		40444
" 14	"	40445	E. D. Collette & Co., 95 Bleury St., Montreal.....	3 "	45	"		40445
" 14	"	40446	Beauvais et freres, 336 St. Lawrence St., Montreal.....	3 "	40	"		40446
DISTRICT OF OTTAWA—J. A. RICKEY, INSPECTOR.								
Mar. 15	Turpentine.....	42942	George Hignman Son & Co., Ottawa.....	3 bds.	45	Ottawa Paint Works, Ottawa.....	Labelled Pure Spirits of Turpentine.	42942
" 15	"	42943	William Howe, Rideau St., Ottawa.....	3 "	25	Southern States Turpentine Co., Cleveland, Ohio.		42943
" 15	"	42944	J. B. Duford, Ottawa.....	3 "	38	W. G. Charleson, Ottawa.....		42944
" 15	"	42945	The Ottawa Paint Works, Ottawa.....	3 "	38	Am. Naval Stores Co., New York.....	Labelled Pure Spirits of Turpentine.	42945
" 15	"	42946	John Storr, Ottawa.....	3 "	38	Southern States Turpentine Co., Cleveland, Ohio.		42946

DISTRICT OF KINGSTON—JAS. HOGAN, INSPECTOR.

Mar. 1	Turpentine.....	44201 J. Nugent, Kingston.....	3 pta.	50	Queen City Oil Co., Kingston.....	44201
"	"	44202 J. B. Bunt, Kingston.....	3 "	45	A. Chown, Kingston.....	44202
"	"	44203 W. Mitchell, Kingston.....	3 "	50	North Carolina Production Co., Montreal.....	44203
"	"	44205 A. Chown & Co., Kingston.....	3 "	35	New York Agent, Direct from Havana.....	44205
"	"	44256 A. B. Dalton & Sons, Kingston.....	3 "	40	Am. Navy Stores New York.....	44256

DISTRICT OF TORONTO—H. J. DAGER, INSPECTOR.

"	2	Turpentine.....	41399 Geo. Pearsall & Son, 417 Yonge St., Toronto.....	3 pta.	45	The Queen City Oil Co., Ltd., Toronto.....	41399
"	2	"	41400 W. C. McFarland, 391-393 Parliament St., Toronto.....	3 "	50	J. H. Morrin & Co., Toronto.....	41400
"	4	"	41497 J. M. B. Stephens, New Market.....	3 "	60	Brandram & Henderson, Montreal.....	41497
"	7	"	41498 Thomas Ramsay, Market Square, Hamilton.....	3 "	37	Carolina Pine Products Co., Cleveland, Ohio.....	41498
"	8	"	41499 Alexander Hardware Co., Ltd., St. E., Hamilton.....	King 3 "	40	A. Ramsay & Son, Montreal.....	41499

DISTRICT OF LONDON—T. KIDD, INSPECTOR.

Mar. 15	Turpentine	44731 — Howell, Goderich	1 pt.	20	Canada Paint Co.	44731
" 18	"	44733 Matt. Williams, Seaforth.	3 bots.	30	Gorman & Eckert, London	44733
Apr. 11	"	44736 W. Barley, Mitchell	3 "	30	Unknown ..	44736
" 14	"	44745 Will Bartlett, St. Mary's	1½ pt.	15	Sanders & Percy, Toronto.	44745
" 19	"	44748 J. Minnes, Hardware Merchant, Fergus.	1 pt.	20	" " ..	44748

TABLE I, (PART I) BULL 211—TURPENTINE—Continued.

Date of Collection.	Name of Sample.	Name and Address of Vendor.	Cost.		Inspector's Report. (In not an expression of opinion.)	No. of Sample.
			Quantity.	Centre.		
DISTRICT OF WINDSOR—JNO. TALBOT, INSPECTOR.						
1910.						
Mar. 2	Turpentine	42501 Kilpatrick Bros., London, Ont.	3 pbs.	30	Hobbs Hardware Co., London, Ont.	42501
"	"	42502 Robert Parson, London, Ont.	3 "	30	D. H. Howden Co., London, Ont.	42502
"	"	42503 McLean Hardware Co., London, Ont.	3 "	30	D. H. Howden Co., London, Ont.	42503
"	"	42504 Purdow Hardware Co., London, Ont.	3 "	30	Am. Naval Stores, Detroit.	42504
"	"	42505 W. B. Gillespie, London, Ont.	3 "	30	D. H. Howden & Co., London.	42505
DISTRICT OF MANITOBA—A. C. LARIVIERE, INSPECTOR.						
Mar. 15	Turpentine	39871 Linklater Bros. & Elder, Winnipeg.	50 pbs.	50	G. F. Stephens & Co., Winnipeg.	39871
"	"	39872 C. Tadman, Winnipeg.	3 "	50	" "	39872
"	"	39873 The Bee Hive, Winnipeg.	3 "	45	" "	39873
"	"	39874 The Lennox Hardware Co., Winnipeg.	3 "	50	Unknown	39874
"	"	39875 Wm. Johnson, Winnipeg.	3 "	45	" "	39875
DISTRICT OF CALGARY—R. W. FLETCHER, INSPECTOR.						
Mar. 15	Turpentine	35637 J. J. Hewit, Medicine Hat	3 pbs.	60	Canada Paint Co., Montreal.	35637
"	"	35638 Linton & Hall, Calgary.	3 "	60	Imperial Oil Co., Calgary.	35638
"	"	35639 Corner Hardware Co., Ltd., Calgary.	3 "	60	Marshall Wells Co., Winnipeg.	35639

"	17	"	"	35640	The J. H. Ashdown Hardware Co., 3 " " " 60	Imperial Oil Co., Calgary	35640
"	18	"	"	35641	T. R. Stuart & Co., Calgary	G. F. Stephens Co., Calgary	35641

DISTRICT OF VANCOUVER—J. F. POWER, INSPECTOR.

Mar. 15	Turpentine	37853	J. A. Flett, Vancouver	3 pts.	40	Imperial Oil Co., Victoria, B.C.	37853
"	"	37854	Wood, Vallance & Leggett, Vancouver	3 "	40	"	37854
"	"	37855	Fraser Hardware Co., Vancouver	3 "	55	"	37855
"	"	37856	Absconbie Hardware Co., Vancouver	3 "	50	"	37856
"	"	37857	Bonnell Hardware Co., Vancouver	3 "	55	"	37857

DISTRICT OF VICTORIA—D. OSULIVAN, INSPECTOR.

Mar. 21	Turpentine	41674	The Stanland Co., Victoria, B.C.	3 pts.	50	Imperial Oil Co.	41674
"	"	41675	Mellor Bros., Ltd., Victoria, B.C.	3 "	60	"	41675
"	"	41676	Melrose Paint Co., Victoria, B.C.	3 "	40	"	41676
"	"	41677	J. L. Forriester, Victoria, B.C.	3 "	45	British Am. Paint Co., Victoria, B.C.	41677
"	"	41678	British Am. Paint Co., Victoria, B.C.	3 "	40	Imperial Oil Co., Vancouver, B.C.	41678
"	"	A	"	"	"	"	A
"	"	B	Canada Turpentine Co., per E. Fielding	"	"	Steam process, Wood Turpentine	B
"	"	C	Canada Turpentine Co., per R. Munroe	"	"	"	C
"	"	D	Casillac Turpentine Co., per E. Fielding	"	"	No. 1 Grade Steam Process Wood Turpentine	D
"	"	E	E. Fielding	"	"	Wood Turpentine from Georgia	E
"	"	F	"	"	"	"	F
"	"	G	"	"	"	"	G
"	"	H	"	"	"	"	H
"	"	I	"	"	"	"	I
"	"	K	Sunmer Co., Moncton, N.B. L. 70451	"	"	"	K

TABLE I, (PART II) BULL.

RESULTS OF

Name of Inspectoral District.	Number of Sample.	Hubl Iodine Number.	Insol. Residue from 10 cc. with 40cc. H ₂ SO ₄ 4 Conc. 1 fum.	Ref. Index 20° of Insoluble Residue.	Ref. Index 20° of Turpentine.	Sp. Gr. 15° of Turpentine.	Distillation Temp. 1st 25 cc. from 100 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	Ref. Index Fraction 1st 25 cc. Distillate.
Nova Scotia.....	41941	290 4	3 0	1 4667	1 4668	8594 150	160 160	165 165	174 175	197 1	4626
	41942	293 4	2 1	1 4687	1 4678	8634 154	160 160	164 164	173 173	202 1	4644
	41943	303 1	8	1 4898	1 4720	8637 159	162 162	164 164	167 167	172 1	4693
	41944	377 5	65	1 4967	1 4719	8746 153	157 157	158 158	159		1 4692
	41945	251 5	3 5	1 4643	1 4660	8576 154	160 160	166 166	174 174	215 1	4621
Prince Edward Island	38626	372 3	75	1 4894	1 4703	8710 150	156 156	157 157	158 158	163 1	4680
	38627	223 0	3 85	1 4506	1 4640	8574 148	158 158	166 166	180 180	227 1	4604
	38628	351 2	1 5	1 4849	1 4692	8652 154	157 157	158 158	159 159	165 1	4680
	38629	386 9	1 05	1 4906	1 4708	8684 152	156 156	157 157	158 158	161 1	4687
	38630	369 2	7	1 4991	1 4717	8759 154	157 157	158 158	161 161	171 1	4690
New Brunswick.....	33640	335 5	1 35	1 4865	1 4686	8670 145	156 156	157 158	159 159	164 1	4628
	33641	368 9	9	1 5006	1 4710	8718 154	157 157	157 157	159 159	163 1	4690
	33642	363 5	1 3	1 4874	1 4686	8663 149	155 155	157 157	159 159	163 1	4624
	33643	363 4	1 06	1 4820	1 4688	8657 145	156 156	158 158	159		1 4619
	33644	200 7	3 6	1 4678	1 4658	8589 152	159 160	164 164	177 177	210 1	4624
Quebec	36523	330 2	95	1 4965	1 4714	8747 152	156 156	158 158	160 160	169 1	4678
	36524	289 6	4 00	1 4483	1 4559	8366 110	148 148	154 154	158 158	162 1	4322
	36525	295 8	2 65	1 4694	1 4657	8589 152	158 158	161 161	166 166	178 1	4628
	36526	265 8	1 05	1 5000	1 4706	8692 153	157 157	158 158	168 168	158 1	4686
	36527	290 8	3 05	1 4524	1 4553	8339 120	144 144	152 152	157 157	161 1	4356
St. Hyacinthe.	1256	256 2	3 9	1 4652	1 4628	8607 153	160 160	163 163	172 172	193 1	4582
	1257	365 0	75	1 4980	1 4714	8730 154	158 159	158 158	160 160	164 1	4689
	1258	350 3	85	1 4952	1 4731	8870 150	157 157	159 159	165 165	210 1	4679
	1259	246 5	3 9	1 4673	1 4655	8579 154	162 162	167 167	181 181	227 1	4617
	1260	241 2	2 9	1 4481	1 4654	8576 151	161 161	168 168	177 177	215 1	4587
Montreal	40442	344 1	65	1 4936	1 4730	8674 152	157 157	160 160	164 165	205 1	4678
	40443	373 8	85	1 4937	1 4718	8735 152	156 156	156 156	160 160	167 1	4681
	40444	355 4	6	1 4826	1 4700	8683 150	155 155	156 156	158 158	162 1	4672
	40445	369 1	1 0	1 4903	1 4702	8707 150	156 156	158 158	159		1 4667
	40446	368 9	1 3	1 4887	1 4687	8690 152	156 156	157 157	159 159	162 1	4667
Ottawa	42942	366 6	1 0	1 5012	1 4703	8691 149	156 156	156 156	158 158	159 1	4697
	42943	306 0	2 5	1 4695	1 4660	8668 150	156 156	158 158	160 160	175 1	4633
	42944	276 0	2 5	1 4688	1 4661	8615 152	156 156	159 159	165 165	175 1	4634
	42945	376 8	1 1	1 5040	1 4716	8681 155	157 157	159 159	160 160	161 1	4702
	42946	295 7	2 8	1 4696	1 4657	8595 152	157 158	160 160	164 164	174 1	4628
Kingston	44201	360 4	1 3	1 4894	1 4704	8706 155	157 157	158 158	160 160	168 1	4682
	44202	337 3	1 0	1 4956	1 4714	8754 152	157 157	158 158	159 160	168 1	4693
	44203	250 8	3 8	1 4653	1 4658	8576 150	160 160	165 165	179 179	227 1	4612
	44205	373 2	8	1 4984	1 4714	8748 150	157 157	158 158	160 160	168 1	4686
	44256	369 5	1 0	1 5000	1 4716	8696 155	157 158	158 158	159 159	161 1	4698
Toronto	41399	382 2	1 0	1 4977	1 4701	8690 153	156 156	156 156	157 157	162 1	4679
	41400	385 3	1 1	1 4914	1 4697	8669 152	157 157	158 158	159 159	162 1	4664
	41497	351 6	95	1 4977	1 4715	8720 155	157 157	158 158	159 159	163 1	4702
	41498	237 3	3 8	1 4604	1 4643	8582 145	159 159	166 166	176 176	220 1	4560
	41499	395 0	95	1 5000	1 4703	8688 153	155 155	155 155	158		1 4687
London	44731	358 1	95	1 5008	1 4714	8705 151	156 156	158 158	159 159	163 1	4690
	44733	358 0	9	1 4987	1 4696	8692					
	44736	363 9	75	1 5014	1 4718	8819 153	156 156	157 157	160 160	176 1	4686
	44745	375 1	6	1 4952	1 4716	8681 153	156 156	157 157	157 157	162 1	4678
	44748										
Windsor	42501	360 1	8	1 4923	1 4702	8698 152	157 157	157 157	158 158	163 1	4686
	42502	363 7	65	1 4994	1 4706	8699 153	155 155	156 156	157 157	162 1	4686
	42503	392 6	7	1 4937	1 4700	8679 153	156 156	157 157	157 157	159 1	4687
	42504	380 5	65	1 4993	1 4705	8702 152	155 155	156 156	158 158	162 1	4687
	42505	375 6	6	1 4974	1 4700	8678 150	156 156	156 156	157		1 4688

* Small sample

† Sample in dirty bottle and therefore not worked.

211—TURPENTINE.

ANALYSIS.

Fraction 2nd 25 cc.	Fraction 3rd 25 cc.	Fraction 4th 15 cc.	Residue of 10 cc.	Residue of 25 cc.	DISTILLATION TEMPERATURE OF 90 CC. FROM 100.												Flash Point.	Number of Sample.	Remarks and Opinion of the Chief Analyst.
					Under 160°	160°-164°	165°-169°	170°-174°	175°-179°	180°-184°	185°-189°	190°-194°	195°-199°	200°					
1 4651 1 4671 1 4680 1 4775						3 18 29 17	8 4 5 3 2 1								34 0	41941	Contains petroleum.		
1 4659 1 46 1 4686 1 4818						1 21 34 14	8 4 3 2 1 1								36 5	41942	"		
1 4704 1 4717 1 4738 1 4838						5 48 31 6									38 5	41943	Wood turpentine.		
1 4696 1 4703				1 4808											33 5	41944	Genuine.		
1 4644 1 4663 1 4672 1 4793						1 15 27 18	11 7 2 1 1 1 6								36 5	41945	Contains petroleum.		
1 4690 1 4693 1 4707 1 4889					0 5 78 7										32 5	38626	Genuine.		
1 4627 1 4653 1 4683 1 4926					3 7 23 14 18	6 5 1 4 1 1									33	38627	Contains petroleum.		
1 4691 1 4692 1 4703 1 4750					2 80 8										34 5	38628	Doubtful.		
1 4694 1 4700 1 4704 1 4820					3 83 4										33	38629	Genuine.		
1 4698 1 4702 1 4719 1 5006					3 67 16 3 1										31 5		"		
1 4676 1 4693 1 4713 1 4909					2 17 68 3										29	38640	Doubtful.		
1 4697 1 4702 1 4714 1 4894					1 78 11										33 5	38641	Genuine.		
1 4677 1 4694 1 4713 1 4887					3 17 61 9										27	38642	Doubtful.		
1 4676 1 4696				1 4790											28	38643	"		
1 4654 1 4666 1 4673 1 4788					5 20 24 13	7 5 3 2 2 4 1									35	38644	Contains petroleum.		
1 4695 1 4702 1 4715 1 4976					5 70 12 3										32 5	38623	Doubtful.		
1 4550 1 4636 1 4677 1 4800					32 23 32 3										12	38624	Contains petroleum.		
1 4650 1 4666 1 4673 1 4747					3 36 30 15 5 1										33	38625	"		
1 4698 1 4702 1 4720 1 4832					2 88										32 5	38626	Genuine.		
1 4516 1 4620 1 4676 1 4813					11 21 25 3										9	38627	Contains petroleum.		
1 4603 1 4611 1 4608 1 5074					2 23 34 11	9 5 1 2 3									37	1256	"		
1 4790 1 4704 1 4718 1 4937					2 69 18 1										34	1257	Genuine.		
1 4707 1 4689 1 4774 1 5166					7 50 18 5 4 2 1 1 1									2 33 5	1258	Doubtful.			
1 4644 1 4659 1 4679 1 4800					3 12 26 15 12 3 4 3 1 0									37	1259	Contains petroleum.			
1 4640 1 4664 1 4682 1 4839					4 17 17 16 13 10 5 1 1 1 15									36	1260	"			
1 4694 1 4707 1 4767 1 5196					10 38 27 6 5 1 1 1 1									35	40442	Doubtful.			
1 4688 1 4702 1 4719 1 4974					5 68 14 3										33 5	40443	Genuine.		
1 4690 1 4700 1 4710 1 4846					10 73 7										31 5	40444	Doubtful.		
1 4687 1 4696				1 4792											31 5	40445	Genuine.		
1 4684 1 4686 1 4708 1 4779					5 78 10										32	40446	"		
1 4702 1 4704 1 4717 1 4813					1 8 81										35 5	42942	Doubtful.		
1 4655 1 4664 1 4674 1 4800					13 54 18 4 1										33	42943	Contains petroleum.		
1 4650 1 4674 1 4677 1 4790					10 47 18 11 4										34	42944	"		
1 4704 1 4710 1 4724 1 4789					0 73 17										34 5	42945	Genuine.		
1 4658 1 4662 1 4670 1 4760					7 44 28 8 3										33 5	42946	Contains petroleum.		
1 4692 1 4701 1 4712 1 4868					69 17 4										33 5	44201	Doubtful.		
1 4696 1 4702 1 4721 1 4947					4 71 13 2										34 5	44202	"		
1 4642 1 4663 1 4676 1 4805					4 18 28 11 10 9 3 2									35	44203	Contains petroleum.			
1 4694 1 4700 1 4716 1 4963					1 66 18 2										33 5	44205	Genuine.		
1 4701 1 4708 1 4718 1 4808					3 7										34	44256	"		
1 4690 1 4696 1 4708 1 4873					4 83 3										32 5	41399	"		
1 4694 1 4706 1 4718 1 4812					5 71 14										31	41400	"		
1 4703 1 4713 1 4726 1 4883					7 7 13										34 5	41497	Doubtful.		
1 4616 1 4646 1 4674 1 4894					3 14 17 14 15 9 6 2 2 1 2 5									34 5	41498	Contains petroleum.			
1 4690 1 4696				1 4750											33 5	41499	Genuine.		
1 4702 1 4710 1 4723 1 4897					5 76 9										34 5	44731	Doubtful.		
1 4697 1 4702 1 4727 1 5053					5 69 5 8 2 1										28 0	44733	"		
1 4689 1 4693 1 4708 1 4836					5 80 5										34 5	44736	Genuine.		
															34 0	44745	"		
1 4690 1 4702 1 4707 1 4813					11 70 9										34 5	44748	Not worked.		
1 4688 1 4700 1 4713 1 4885					6 80 4										32 5	42501	Doubtful.		
1 4690 1 4698 1 4710 1 4796					5 85										33 0	42502	Genuine.		
1 4691 1 4698 1 4713 1 4878					5 78 7										33 5	42504	"		
1 4691 1 4700				1 4746											33 5	42506	"		

TABLE I, (PART II) BULL.

RESULTS OF

Name of Inspectoral District.	Number of Sample.	Hubb. Leduc Number.	Insol. Residue from 10 cc. with 40 cc. H ₂ SO ₄ 4 Conc. 1 fum.	Ref. Index 20° of Insoluble Residue.	Ref. Index 20° of Turpentine.	Sp. gr. 15° of Turpentine.	Distillation Temp. 1st 25 cc. from 100 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	Ref. Index 1st 25 cc. Distillate.
Manitoba.....	39871	380-8	1-15	1-4930	1-4696	8681	152-157	157-157	157-158	158-163	1-4679
	39872	373-2	95	1-4922	1-4699	8697	152-155	155-156	156-157	157-162	1-4673
	39873	341-1	1-15	1-4900	1-4702	8698	152-155	155-156	156-158	158-169	1-4676
	39874	359-6	95	1-4959	1-5705	8726	150-155	155-156	156-158	158-164	1-4667
Calgary.....	39875	361-7	9	1-4927	1-4704	8732	152-156	156-157	157-159	159-157	1-4676
	35637	380-9	75	1-4954	1-4707	8722	149-156	156-156	156-159	.....	1-4668
	35638	358-3	95	1-4936	1-4702	8662	148-153	153-157	157-158	158-168	1-4658
	35639	354-6	85	1-4934	1-4703	8720	152-157	157-158	158-160	160-167	1-4672
	35640	369-8	1-0	1-4918	1-4694	8685	146-156	156-157	157-159	159-167	1-4676
Vancouver.....	35641	367-4	95	1-4945	1-4701	8719	152-156	156-157	157-157	157-167	1-4667
	37853	298-6	2-6	1-4650	1-4650	8589	145-157	157-161	161-169	170-225	1-4584
	37854	368-1	65	1-4990	1-4703	8684	155-157	157-157	157-158	.....	1-4687
	37855	272-5	3-3	1-4596	1-4631	8534	140-158	158-162	162-175	175-210	1-4570
	37856	345-1	7	1-4984	1-4703	8694	152-156	156-156	156-158	.....	1-4690
Victoria.....	37857	368-8	75	1-4976	1-4702	8679	152-155	155-156	156-157	.....	1-4674
	41674	367-1	7	1-4804	1-4686	8661	140-152	152-154	154-156	.....	1-4606
	41675	352-0	95	1-4779	1-4682	8653	140-155	155-158	158-159	.....	1-4610
	41676	299-0	2-85	1-4615	1-4645	8548	140-157	157-161	161-172	172-215	1-4570
	41677	284-0	3-2	1-4620	1-4637	8538	145-158	158-162	162-174	174-220	1-4572
	41678	399-6	85	1-4944	1-4680	8653	140-155	155-157	157-159	159-165	1-4602
	A	295-8	1-3	1-4943	1-4704	8705	155-160	160-162	162-167	167-176	1-4677
	B	344-4	7	1-4986	1-4678	8681	.....	.....	.....	.....	.....
	C	317-1	9	1-4948	1-4696	8664	.....	.....	.....	.....	.....
	D	331-5	9	1-4884	1-4678	8670	.....	.....	.....	.....	.....
	E	349-1	55	1-4971	1-4688	8700	.....	.....	.....	.....	.....
	F	290-3	6	1-4947	1-4750	9065	.....	.....	.....	.....	.....
	G	247-8	35	1-5013	1-4800	9288	.....	.....	.....	.....	.....
	H	372-5	1-0	1-5003	1-4702	.....	155-157	157-157	157-158	158-158	1-4688
	I	238-0	4-15	1-4600	1-4631	.....	148-159	159-165	165-180	180-215	1-4564
	K	211-4	4-0	1-4634	1-4651	8562	151-161	161-164	165-177	177-206	1-4603

211—TURPENTINE.

ANALYSIS.

Re-d. Index 1st 25 cc. Distillate.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	Residue 10 cc.	Residue 25 cc.	DISTILLATION TEMPERATURE OF 90 CC. FROM 100.												Flash Point.	Number of Sample.	Remarks, and opinion of the Chief Analyst.
						Under 150°.	150°-154°.	155°-159°.	160°-164°.	165°-169°.	170°-174°.	175°-179°.	180°-184°.	185°-189°.	190°-194°.	195°-199°.	200°.			
31 1 4679	1 4689	1 4694	1 4709	1 4816	.....	.....	3 79	8	.....	.....	.....	.....	.....	.....	.....	.....	32 0	39871	Genuine.
32 1 4673	1 4689	1 4699	1 4718	1 4830	.....	.....	15 70	5	.....	.....	.....	.....	.....	.....	.....	.....	32 0	39872	"
30 1 4676	1 4683	1 4692	1 4703	1 4870	.....	.....	5 72	10	3	.....	.....	.....	.....	.....	.....	.....	33 0	39873	Doubtful.
34 1 4667	1 4686	1 4698	1 4713	1 4913	.....	.....	18 64	8	.....	.....	.....	.....	.....	.....	.....	.....	31 5	39874	"
37 1 4676	1 4697	1 4703	1 4716	1 4933	.....	.....	7 74	7	1	.....	.....	.....	.....	.....	.....	.....	31 0	39875	"
1 4668	1 4690	1 4700	.....	.....	4807	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32 0	35637	Genuine.
38 1 4658	1 4688	1 4700	1 4718	1 4970	.....	.....	2 12	65	8	3	.....	.....	.....	.....	.....	.....	31 5	35638	Doubtful.
37 1 4672	1 4698	1 4704	1 4713	1 4937	.....	.....	7 30	23	2	.....	.....	.....	.....	.....	.....	.....	32 0	35639	"
37 1 4676	1 4687	1 4694	1 4705	1 4884	.....	.....	3 47	10	2	.....	.....	.....	.....	.....	.....	.....	34 0	35640	"
37 1 4667	1 4692	1 4700	1 4718	1 4951	.....	.....	7 75	7	2	.....	.....	.....	.....	.....	.....	.....	32 5	35641	Genuine.
25 1 4584	1 4654	1 4668	1 4666	1 4800	4 11	28	24	8	4	3	2	2	1	1	2	27 5	37853	Contains petroleum.
1 4687	1 4643	1 4660	1 4675	1 4840	1 4750	.....	6 6	22	22	13	5	4	3	2	.....	.....	34 0	37854	Genuine.
0 1 4570	1 4693	1 4710	.....	.....	1 4753	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21 5	37855	Contains petroleum.
1 4690	1 4686	1 4699	.....	.....	1 4746	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34 0	37856	Doubtful.
1 4674	1 4683	1 4698	.....	.....	1 4780	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32 0	37857	Genuine.
1 4606	1 4677	1 4694	.....	.....	1 4769	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 0	41674	Doubtful.
1 4610	1 4648	1 4663	1 4662	1 4790	5 10	25	24	8	7	2	2	2	1	1	3	24 0	41675	"
5 1 4570	1 4636	1 4663	1 4650	1 4740	4 9	21	23	12	9	3	2	2	2	1	2	25 0	41676	Contains petroleum.
0 1 4572	1 4677	1 4696	1 4714	1 4930	.....	.....	6 16	53	15	.....	.....	.....	.....	.....	.....	.....	26 0	41677	"
5 1 4602	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 5	41678	Doubtful.
5 1 4677	1 4687	1 4706	1 4726	1 4873	.....	.....	20	46	16	7	1	.....	.....	.....	.....	.....	35 5	A	Wood turpentine.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	C	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	D	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	E	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	F	"
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	G	"
1 4688	1 4697	1 4704	1 4713	1 4786	.....	.....	90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	H	Genuine.
1 4564	1 4624	1 4646	1 4663	1 4776	2 9	17	22	16	6	8	5	3	1	1	5	30 1	I	Contains petroleum.
1 4603	1 4640	1 4655	1 4668	1 4830	.....	.....	4 19	21	16	10	10	4	2	1	1	2	35 0	K	"

TABLE II.—TURPENTINE.

No. of Sample.	Iodine Number.	Residue from 10 cc. SO ₂ Insoluble in H ₂	Refractive index of Insoluble residue.	Refractive index of the Sample.	Specific gravity of the Sample.	FRACTIONATION OF 100 CC.				REFRACTIVE INDICES OF FRACTIONS AND RESIDUES.					VOLUMES OBTAINED FROM 100 CC.										Flash Point.				
						1st 25 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	1st 25 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	Residue.	Res. 25 cc.	Below 150													
																	Above 190	to 154	to 159	to 164	to 169	to 174	to 179	to 184		to 189	to 194	to 199	
35637	380.9	0.75	1.4954	1.4707	0.8722	149	156	156	156	159	163	1.4668	1.4690	1.4700	1.4668	1.4690	1.4700	1.4668	1.4690	1.4700	1.4668	1.4690	1.4700	1.4668	1.4690	1.4700	1.4668	32.0	
36626	372.8	0.75	1.4994	1.4703	0.8719	150	156	156	157	157	158	158	163	1.4680	1.4690	1.4693	1.4707	1.4680	1.4690	1.4693	1.4707	1.4680	1.4690	1.4693	1.4707	1.4680	1.4690	1.4693	32.5
36629	396.9	1.05	1.4966	1.4708	0.8684	152	156	156	157	157	158	158	161	1.4687	1.4694	1.4694	1.4709	1.4687	1.4694	1.4694	1.4709	1.4687	1.4694	1.4694	1.4709	1.4687	1.4694	1.4694	32.0
36671	380.8	1.15	1.4960	1.4686	0.8681	152	157	157	157	157	158	158	163	1.4679	1.4689	1.4694	1.4718	1.4679	1.4689	1.4694	1.4718	1.4679	1.4689	1.4694	1.4718	1.4679	1.4689	1.4694	32.0
36872	373.2	0.96	1.4922	1.4639	0.8697	152	155	155	156	156	162	167	167	1.4681	1.4688	1.4702	1.4719	1.4681	1.4688	1.4702	1.4719	1.4681	1.4688	1.4702	1.4719	1.4681	1.4688	1.4702	32.5
40443	373.8	0.85	1.4977	1.4719	0.8735	152	156	156	156	156	160	160	167	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	32.5
41309	362.2	1.00	1.4977	1.4701	0.8699	153	156	156	156	156	157	157	162	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	1.4708	1.4679	1.4680	1.4696	32.5
41499	395.0	0.65	1.5000	1.4703	0.8688	153	155	155	155	158	161	161	167	1.4682	1.4690	1.4703	1.4713	1.4682	1.4690	1.4703	1.4713	1.4682	1.4690	1.4703	1.4713	1.4682	1.4690	1.4703	32.5
41944	377.5	0.65	1.4967	1.4719	0.8746	153	157	157	157	158	158	159	162	1.4686	1.4686	1.4698	1.4713	1.4686	1.4686	1.4698	1.4713	1.4686	1.4686	1.4698	1.4713	1.4686	1.4686	1.4698	32.5
42502	383.7	0.65	1.4994	1.4706	0.8699	153	156	156	156	156	157	157	159	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	32.5
42503	392.6	0.70	1.4997	1.4700	0.8679	153	156	156	157	157	157	157	159	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	1.4708	1.4687	1.4687	1.4691	32.5
42504	380.5	0.65	1.4974	1.4716	0.8702	152	155	155	156	156	158	162	162	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	32.5
42505	375.6	0.60	1.4984	1.4716	0.8678	150	156	156	156	156	160	160	161	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	32.5
42945	376.8	1.10	1.5000	1.4714	0.8748	150	157	157	157	158	158	160	168	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	34.0
44245	375.1	0.60	1.4982	1.4716	0.8681	153	156	156	156	156	157	157	162	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	34.5
44745	375.1	0.75	1.5014	1.4718	0.8819	153	156	156	156	156	160	160	168	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	1.4708	1.4678	1.4678	1.4693	34.5
44736	363.9	0.95	1.4945	1.4701	0.8719	152	155	155	155	157	157	157	161	1.4686	1.4686	1.4697	1.4702	1.4686	1.4686	1.4697	1.4702	1.4686	1.4686	1.4697	1.4702	1.4686	1.4686	1.4697	32.5
35641	367.4	1.05	1.5000	1.4706	0.8692	153	157	157	157	158	158	158	161	1.4686	1.4686	1.4696	1.4702	1.4686	1.4686	1.4696	1.4702	1.4686	1.4686	1.4696	1.4702	1.4686	1.4686	1.4696	32.0
36626	375.8	1.05	1.4990	1.4703	0.8684	155	157	157	157	157	157	158	161	1.4687	1.4687	1.4696	1.4702	1.4687	1.4687	1.4696	1.4702	1.4687	1.4687	1.4696	1.4702	1.4687	1.4687	1.4696	32.0
37854	368.1	0.75	1.4967	1.4702	0.8679	152	155	155	155	156	156	159	161	1.4680	1.4680	1.4698	1.4702	1.4680	1.4680	1.4698	1.4702	1.4680	1.4680	1.4698	1.4702	1.4680	1.4680	1.4698	34.5
37857	368.8	0.75	1.4991	1.4717	0.8718	154	157	157	157	157	157	159	163	1.4680	1.4680	1.4697	1.4702	1.4680	1.4680	1.4697	1.4702	1.4680	1.4680	1.4697	1.4702	1.4680	1.4680	1.4697	34.5
38680	369.2	0.90	1.5006	1.4710	0.8707	150	156	156	156	156	159	163	163	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	31.5
39641	368.9	1.00	1.4983	1.4702	0.8707	150	156	156	156	156	159	163	163	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	1.4714	1.4667	1.4667	1.4687	31.5
40445	369.1	1.30	1.4987	1.4687	0.8660	152	156	156	156	157	157	159	162	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	31.5
40446	368.9	1.00	1.4914	1.4697	0.8669	152	157	157	157	158	158	159	162	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	31.5
41400	365.3	1.10	1.4914	1.4697	0.8669	152	157	157	157	158	158	159	162	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	1.4706	1.4664	1.4664	1.4684	31.5
44256	369.5	1.00	1.5000	1.4710	0.8666	155	157	157	157	158	158	159	161	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	1.4708	1.4681	1.4681	1.4691	31.5
1257	365.0	0.75	1.4980	1.4714	0.8730	154	158	158	158	158	160	160	166	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	31.0
H	372.5	1.00	1.5003	1.4702	.....	155	157	157	157	157	158	158	161	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	1.4704	1.4688	1.4688	1.4697	31.0

* Somewhat irregular.

1257 365.0 0.3 1.4380 1.4713 0.6160
 H 372.5 1.00 1.5043 1.4702 185-157 157-157 157-158 158-158 1.4688 1.4687 1.4704 1.4713 1.4780

* Somewhat irregular.

TABLE III.

Designation of Sample.	Hubl Leadine Number.	Residue from 10 cc. insoluble in H ₂ SO ₄ .	Refractive index of insoluble residue.	Refraction index of the Sample.	Specific Gravity of the Sample.	FRACTIONATION OF 100 CC.				REFRACTIVE INDICES OF FRACTIONS AND RESIDUES.						VOLUMES OBTAINED FROM 100 CC.												Flash Point.
						1st 25 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	1st 25 cc.	2nd 25 cc.	3rd 25 cc.	Next 15 cc.	Residue.	Res. 25 cc.	Under 150	150-154	155-159	160-164	165-169	170-174	175-179	180-184	185-189	190-194	195-199	200-	
A	215.5	1.3	1.4943	1.4704	0.8705	155-160	160-162	162-167	167-176	1.4677	1.4687	1.4706	1.4726	1.4673				20	46	16	7	1						35.5
B	344.4	7	1.4986	1.4678	0.8681																							
C	317.1	9	1.4948	1.4696	0.8664																							
D	331.5	9	1.4884	1.4678	0.8670																							
E	349.1	55	1.4971	1.4688	0.8700																							
F	250.3	6	1.4947	1.4750	0.9065																							
G	247.8	35	1.5013	1.4800	0.9288																							
I	238.0	4.15	1.4600	1.4631	0.8502	148-159	159-165	165-180	180-215	1.4554	1.4624	1.4646	1.4663	1.4776			9	17	22	16	6	3	5	3	1	1	8	30.5
K	211.4	4.0	1.4634	1.4651	0.8502	151-161	161-164	165-177	177-206	1.4603	1.4640	1.4655	1.4668	1.4830			4	19	21	16	10	10	4	2	1	1	1	35